regularly more successful than foreign pollen. "If this is true, crossing is without effect until . . . . the union of the male and female nuclei." In certain of the inbred strains the author records a marked tendency toward dioecism. Some of the inbred strains which maintained the highest ovule development were the most deficient in pollen development, while the exact reverse was true in other strains.

In his general discussion the author suggests that the advantages of hybrid vigor may have played their part in the rise of the sporophyte generation. Certainly if his interpretation of the phenomenon is correct (the reviewer believes it is), the advantages of hybrid vigor would be impossible in the gametophyte generation with its haploid equipment.—MERLE C. COULTER.

Perennating fruit of Cactaceae.—JOHNSON[8] has investigated the remarkable behavior of the fruits of certain Cactaceae, using *Opuntia fulgida* as material. The fruits of these Cactaceae remain attached to the plant and actively growing for several or many years. The fruit of *O. fulgida* not only remains attached, unripened, and steadily growing, but the seeds are never shed from the fruit. In addition to this, the matured fruit, or even the ovary of the unripened flower, may give rise to secondary flowers and so to other fruits. As many as 4 or 5 generations of flowers and fruits may thus be formed in a single season. If a mature fruit falls on moist soil, it may develop adventitious roots and shoots and thus initiate a new plant.

The early development of the ovary resembles that of a young vegetative joint, and is entirely stemlike in appearance, with its evanescent leaves, tubercles, and axillary areoles. It is evident, for many reasons, that the whole outer wall of the ovary and fruit is morphologically of stem origin. The continuous formation of flowers is remarkable, as indicated by the following description: "From the axillary buds, or areoles, of the primary flowers that open in May, arise secondary flowers which open in June. From areoles of these, in turn, tertiary flowers open in July, and on the latter quaternary flowers bloom forth in August."

The contribution contains much interesting material that cannot be included in a brief review, but it all presents the unusual habits of a remarkable group of plants.—J. M. C.

Alaria.—YENDO[9] has published a monograph of *Alaria* which is remarkably full in its details and noteworthy in the quality of its plates. The introductory pages deal with the morphology of the genus, every region of the plant being considered, and the development and life history presented, so that the

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[8] JOHNSON, DUNCAN S., The fruit of *Opuntia fulgida*. A study of perennation and proliferation in the fruits of certain Cactaceae. Publ. Carnegie Inst. pp. 62. *pls. 12.* 1918.

[9] YENDO, KICHISABURO, A monograph of the genus *Alaria*. Jour. Coll. Sci. Univ. Tokyo 43:1–145. *pls. 19.* 1919.